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# NASA's Experience in the International Exchange of Scientific and Technical Information in the Aerospace Field

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# **NASA's Experience in the International Exchange of Scientific and Technical Information in the Aerospace Field**

## **ABSTRACT**

The early NASA international scientific and technical information (STI) exchange arrangements were usually detailed in correspondence with the librarians of the institutions involved. While this type of exchange, which involved only hardcopy (paper) products, grew to include some 220 organizations in 43 countries, NASA's main focus shifted substantially to the STI relationship with the European Space Agency (ESA) which began in 1964. The NASA/ESA Tripartite Exchange Program, which now has more than 500 participants, provides more than 4,000 highly relevant technical reports, fully processed, for the NASA-produced "Aerospace Database." In turn, NASA provides an updated copy of this Database, known in Europe as the "NASA File," for access, through ESA's Information Retrieval Service, by participating European organizations. Our experience in the evolving cooperation with ESA has established the "model" for our more recent exchange agreements with Israel, Australia, Canada, and the one under negotiation with Japan. The results of these agreements are made available to participating European organizations through the NASA File.

## **INTRODUCTION**

I was privileged, as the NASA representative, to participate in April 1989 in the ESA-sponsored celebration of the twenty-fifth anniversary of NASA/ESA cooperation in the exchange of STI in Frascati, Italy at their ESRIN Facility. In his commemorative address, Francis Roscian, the Head of ESRIN, acknowledged, with gratitude, the role of NASA in the beginning and development of ESA's Information Retrieval Service (ESA/IRS) into "a forerunner in Europe in online information retrieval technology." He concluded that "without the initial NASA/ESA agreement and helpful attitude of NASA, this would not have been possible." (1) Similarly, Dr. Hermann Strub, Chairman of ESA's Administrative and Finance Committee, and better known here in Germany for his "air and space" role with the German Ministry for Research and Technology (BMFT), noted at the same ceremony that the "very supportive role of NASA should be mentioned, helping the emerging and small European space community in its first years to develop its own competence .... We have to acknowledge this unselfish attitude and thank NASA." (2)

NASA's cooperative attitude and orientation were important aspects of the U.S. space program from the beginning. Its legislative mandate, the National Aeronautics and Space Act of 1958, directed the agency, among other things, to conduct its activities "so as to contribute materially to ... cooperation by the United States with other

nations and groups of nations in work pursuant to this Act and in the peaceful application of the results thereof." (3) Further, the legislation also directed that the Administration "shall provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof." (4) In recent Congressional testimony, Kenneth Pedersen, NASA's Associate Administrator for External Relations, noted that NASA's mandate to cooperate internationally "has been consistently reinforced by succeeding Administrations, most recently in the National Space Policy released by the White House in February, 1988. In fulfillment of this continuing mandate NASA has entered into well over 1,000 agreements with more than 135 countries and international organizations." (5)

## BILATERAL STI DOCUMENT EXCHANGES

In the STI area, we began our international cooperation with organizations with similar interests, primarily governmental research institutes and laboratories, universities, and professional societies, as early as 1959. These undertakings were initiated with a simple, and informal, exchange of letters, frequently at the library level. There are now 220 of these exchanges, what we now call the Bilateral STI Document Exchanges, in 43 countries. Every year, this program is contributing up to 2,500 items to the NASA STI System.

This type of exchange can readily be illustrated by looking at the beginning of NASA's Bilateral STI Document Exchange with our conference host, the German Society for Aeronautics and Astronautics (Deutsche Gesellschaft fuer Luft- und Raumfahrt, DGLR). In his August, 1962, letter to DGLR's predecessor, the Deutsche Gesellschaft fuer Raketentechnik und Raumfahrt, DGRR, Elmo B. Parks, then Chief of NASA's Acquisitions and Dissemination Branch, informed Professor Doctor Ing. Eugen Saenger that NASA "maintains an expanding technical information exchange program to facilitate the effective interchange of ideas and information related to the aeronautical and space sciences among the world's scientific community." He also noted that NASA hoped "that research organizations and academic institutions outside of our country will utilize the scientific and technical information developed within the National Aeronautics and Space Administration. Similarly, NASA hopes to share in information developed by others in their own fields of endeavor."

In seeking to establish the exchange, Mr. Parks indicated that NASA would be pleased "to furnish your organization automatically with unclassified NASA technical publications in those areas appropriate to your field of interest." In addition, NASA would also provide its bi-weekly Technical Publications Announcements (forerunner of the current Scientific and Technical Aerospace Reports, STAR), "which abstracts and indexes NASA documents that are published, as well as other reports having significance to NASA's scientific and technical programs, and reports received under NASA's worldwide information exchange arrangements." In exchange, NASA wished to receive "such information materials as reports, monographs, journals - such as your Raketentechnik und Raumfahrtforschung Mitteilungen der DGRR, preprints, bibliographies, and other types of technical information which your organization may publish."

By 1975, NASA had refined the scope of its STI Database (currently described by NASA SP-7065, The NASA Scientific and Technical Information System ... Its Scope and

Coverage, December 1988) to the point where it was no longer accepting just any input from its exchange partners. Correspondence in this period informed the Bilateral Exchanges that "their contributions should consist of research reports, monographs, preprints, theses, dissertations, meeting papers, bibliographies, listings of research reports issued by other departments or organizations which are available to you and periodic information pertaining to your current research programs." NASA no longer wanted to receive journals, newspapers and reprints of copyrighted journal articles. This was because the published literature (including over 800 foreign journals), was being reviewed for NASA by the Technical Information Service of the American Institute of Aeronautics and Astronautics (AIAA/TIS).

## NASA/ESA STI EXCHANGE AGREEMENT

In 1964, NASA's STI exchange activities took a giant leap forward with the initiation of the agreement with the European Space Research Organization (ESRO), later to become the European Space Agency (ESA). The agreement was an exchange of letters between Dr. Hugh L. Dryden, NASA's Deputy Administrator, and Prof. Pierre Auger, Director General of ESRO. ESRO agreed "to provide NASA abstracts of scientific and technical reports originating from European sources" and processed in "a form suitable for inclusion" in NASA's STAR. In turn, NASA agreed to provide ESRO with copies of STAR. Both parties agreed to exchange microforms of the documents (when ESRO developed such capability), or single copies of the documents covered by the abstracts published in STAR. In addition, ESRO was to service European requests for NASA reports announced in STAR where NASA had no bilateral relationship with the requesting organization. Further, the parties agreed in principle to "exchange material for computer searches at such time as ESRO has established facilities for processing the European input and utilizing the material concerned." (6)

The following year, 1965, the parties further refined the program to provide for the exchange of microfiche and computer search materials. Specifically, ESRO, upon completion of its systems development, agreed to "make available to NASA both magnetic and punched paper tape citations and abstracts of reports sent to NASA, with such materials in a form for immediate input to the NASA system." In turn, NASA agreed to make available to ESRO "search tapes covering materials announced in STAR and IAA, including such back files as may be available." (7)

In 1972, the parties recorded in a single agreement document their exchange requirements and practices as they had evolved to that point. A big step forward was also taken when the parties agreed that searches of the NASA-provided "machine readable" file could be made available by ESRO to "organizations or individuals who are directly engaged in aerospace activities; and organizations in member states with whom satisfactory exchange agreements were negotiated. Thus began the NASA/ESA Tripartite Exchange Program which now has more than 500 participants and provides more than 4,000 highly-relevant technical reports, fully processed, for the NASA-produced "Aerospace Database." In turn, NASA provides an updated copy of this Database, known in Europe as the "NASA File," for access, through ESA/IRS, by participating European organizations. NASA also agreed to "complete arrangements with a number of selected NASA [Bilateral] exchange partners in ESRO Member States whereby the NASA exchange partners will provide their information directly to ESRO." Presently, 30 Bilateral exchange organizations (out of a total of 117 in Western

Europe, 31 of which also have Tripartite status) in Belgium, France, Italy, The Netherlands, Sweden, and Germany are sending their input to NASA through ESA/IRS. And finally, ESRO agreed to "produce English technical translations of selected input (particularly items in French and German)." (8)

The next major step in NASA's exchange relationship with ESA (ESRO and part of ELDO became ESA in 1975) occurred in 1978 when the parties agreed on the establishment of NASA/ESA National Centers in several of the ESA member states for the purpose of identifying sources and ensuring input of aerospace documentation. To date there are ten National Centers: Belgium (CNDST); Denmark (DTB Library); Finland (Technical Research Center of Finland); Germany (Fachinformationszentrum Energie Physik Mathematik); Italy (Agenzia Spaziale Italiana); The Netherlands (COBIDOC); Norway (The Technical University Library of Norway); Spain (INTA); Sweden (Royal Institute of Technology); UK (IRS Dialtech). The Parties also agreed to change the input requirements from "best efforts" to "at least one in-scope document per each connect hour" to the NASA File.

### NATIONAL-LEVEL STI EXCHANGE AGREEMENTS

In the early 1980's, I carried out an extensive evaluation of our Bilateral STI Document Exchange Program in order to assess its effectiveness as an exchange vehicle and its cost-effectiveness in terms of the amount of NASA resources expended compared with the document input received. The results were disappointing. Less than half of the Bilateral organizations carried on our records were still contributing input. I concluded that these informal arrangements had, in many cases, just fallen by the wayside, particularly as the individuals originally involved in the foreign organizations had retired or had otherwise moved on. In addition, it was proving increasingly difficult for us to monitor these exchanges on a regular basis because our resources were increasingly scarce. As a solution, I proposed that we develop a new agreement form which stipulates specific exchange requirements and an expiration date which would be signed by a governmental official in an organization that would be fully responsible for that country's STI relationship with NASA. The results are National-Level STI Exchange Agreements with Israel (Israel Space Agency, 1986); Australia (Defence Science and Technology Organisation, 1988); and Canada (Canada Institute for Scientific and Technical Information, 1989).

Under the terms of a "Technical Protocol," the parties agree that the designated foreign governmental organization is fully responsible for that country's STI relationship with NASA. Further, present Bilateral arrangements in the country would remain unchanged, as long as those organizations continued to qualify, but they would be encouraged to work with NASA through the designated governmental organization. All new requests for Bilateral STI exchanges would be referred to the governmental organization. That organization "undertakes to establish cooperative relationships with all ... organizations [in the country] which can contribute in-scope material ... to the NASA STI System, and to use its best efforts to ensure that each participating ... organization makes its maximum possible in-scope contribution." In return for these maximum in-scope contributions, these participating organizations will be approved for commercial access to the "Aerospace Database." The governmental organization recognizes that "it is NASA's overall objective to achieve a general balance between the total number of in-scope technical documents

contributed and the total amount of access granted to the "Aerospace Database."

The governmental organization is responsible for collecting the contributed technical report materials and ensuring that they are catalogued, indexed and abstracted following the NASA standards, and then submitted to NASA in hardcopy and microfiche. A collation of the bibliographic data is to be submitted in machine-readable form, along with a printed listing of the machine-readable data. The materials to be collected include "in-scope technical reports, working papers, conference papers and proceedings (with titles and abstracts translated into English where the original ... [is not in English]; pre-prints of in-scope journal articles; relevant STI announcement journals (as issued); directories of ... researchers (as published); in-scope university theses and dissertations (with titles and abstracts translated into English where the original language is ... [not English]; [and] available translations of relevant STI materials...."

In turn, in addition to providing approval for participating organizations to access the "Aerospace Database," NASA agrees to provide the following: "one copy of NASA technical reports in the NASA Distribution Divisions, including NASA Special Publications, designated by ... [the foreign governmental organization]; one hardcopy of each issue of the Scientific and Technical Aerospace Reports (STAR), and the annual STAR Index; one hardcopy of each of the Continuing Bibliographies ...; one hardcopy of each of the publications in the Historical Series; [and] one hardcopy of the annual "Journal Holdings of NASA Libraries (when available)."

NASA agrees to the designated governmental organization duplicating NASA provided STI material for distribution to participating organizations. However, "the NASA provided material so distributed may not be redistributed for third-party use, nor reproduced for sale." It is also understood that the NASA provided material is for use solely within that country. With regard to the foreign contributions, the foreign partner assumes responsibility for ensuring that any necessary copyright override permission is obtained. Then, "following its usual practice, NASA will announce publicly available, timely (up two years from date of publication), and in-scope technical report material in STAR. Such reports would, generally, be made publicly available in the United States through the U.S. National Technical Information Service (NTIS)." The foreign corporate source could also be listed as the source in the "availability statement." Unless otherwise limited, "NASA will assume that it has permission to duplicate and make microfiche copies of the material submitted ... and to make it available to all users of the U.S. NTIS." Finally, the agreement lists the program manager on each side and gives an effective period of three years, subject to extension. (9)

## OBSERVATIONS

Ultimately, the success of international cooperative activities depends on the imagination, leadership, and integrity of the individuals involved. Those involved in the origins of our international STI cooperation, on both sides, deserve great credit for their bold and farsighted steps which, at the time, were steps into the unknown. At each major stage in the evolving relationships, strong and imaginative leaders, again on both sides, reached out and took the next logical step. Some have already been mentioned above. In addition, among the many others who have contributed, let me acknowledge the following: (NASA) A.A. (Des) DeSimone, former Chief of NASA's

Distribution and Exchange Branch; and Van A. Wentz, former Director of NASA's STI Division; (ESRO/ESA) John R.U. Page, former ESRO Assistant Director of Education and Scientific Information; N.E.C. Isotta, former Head of ESA/IRS; Francis Roscian, Head of ESRIN; Marino Saksida, Head of ESA/IRS; Gerd Muelhauser, Deputy Head of ESA/IRS and Head of their Systems Division; Irene Mader, Head of ESA/IRS' Aerospace Data Office; and W.A. Martin, formerly with ESA/IRS.

In the case of NASA/ESA cooperation, we began with a simple document exchange and gradually expanded the format and scope to encompass advancing information technologies and techniques. The relationships are, however, dynamic, reflecting changes in economic, political, and technological growth and development on both sides. As Dr. Strub observed, the origins of the NASA/ESA STI cooperation were "a good start to build up to today's partnership in space programmes, such as cooperation of the Space Station Freedom with the European Columbus programme, which is surely the most significant example." (10) And Francis Roscian noted the changes in the relationship when he said that "we want and expect this fruitful cooperation to continue in the future. With the difference that now the 'exchange' of information is no longer one-sided, but is starting to correspond to a fully balanced exchange agreement, where Europe brings to its partner its own know-how." (11) In fact, these changing times have brought about even closer collaboration, as noted by Marino Saksida and Irene Mader: "ESA/IRS has developed in many areas to meet specific ESA and European requirements, but its role still continues to incorporate this long-standing basic collaboration with NASA. As the European capabilities in the area of scientific and technical information have fully matured, the ESA/NASA relationship has grown even closer, to reflect the evolving interest of the parties involved and ensure that this cooperation remains effective and of mutual interest, in the service of the worldwide scientific and technical aerospace community." (12)

NASA, of course, is fully aware of the changing relationships and has sought, with considerable understanding, to sustain the cooperation. On the occasion of the ESA ceremony celebrating the 25th anniversary of our STI cooperation in April 1989 in Frascati, Italy, Van A. Wentz, then Director of NASA's STI Division, wrote to his counterpart, Francis Roscian, that "perhaps the most significant feature of our cooperation for the long haul is the in-depth dialog that has been established between NASA and ESA in information exchange. We have been able to discuss frankly numerous urgent and sensitive issues in the exchange and the diverse perceptions of our respective interests. The NASA/ESA dialog provides us with a viable and stable platform upon which we can air the issues and find those overlapping areas of common interest which will allow our cooperation to go forward." He added that NASA welcomed European "thoughts, comments, and suggestions and, within the context of inevitable budgetary and policy constraints, we will make every effort to find mutually acceptable solutions to the issues which are raised." (13)

As our respective national economies, and in the case of Western Europe, their collective economy, have matured, relationships between developed countries have come to be increasingly viewed in competitive terms. Leading-edge technologies are viewed as the key to national advantage. And STI is equated with the technologies themselves and eyed increasingly as something that must be controlled, particularly in trans-border channels. Both NASA and its STI partners have an interest in not seeing access to international STI dry up. As the BMFT's J. Czermak, Chairman of



ESA's Documentation Advisory Group, DAG, observed, "a sound policy, both in the United States and in Europe, should aim at creating interdependencies and at securing unhindered mutual access to all data bases." (14)

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